

Expeditionary Fighting Vehicle (EFV)

The Expeditionary Fighting Vehicle (EFV) is an armored amphibious assault personnel carrier that will replace the current Marine Corps amphibious assault vehicle (AAV). Two platform variants are under development: the personnel variant (EFV(P)), which will be armed with a 30 mm cannon and a 7.62 mm machinegun and is intended to transport 17 combat-equipped Marines and a three-man crew; and a command and control variant (EFV(C)) which will transport a commander and staff. An operationally configured EFV is expected to weigh about 38 tons; travel in excess of 20 knots in 3-foot significant wave-height sea conditions; and travel at 43 miles per hour on a level, hard-surface road.

The EFV is designed to provide an over-the-horizon amphibious assault capability for Marine Air-Ground Task Force elements embarked aboard amphibious ships. Once ashore, the EFV(P) will provide transportation, protection, and direct fire support. The EFV(C) will serve as a tactical echelon command post.

The EFV entered its System Development and Demonstration (SDD) phase in December 2000. Delays in completing developmental and operational testing resulted in a program restructuring, necessitating a Test and Evaluation Master Plan (TEMP) update. DOT&E approved this update in July 2003. To allow sufficient time for developmental and operational testing before Milestone C, the Marine Corps requested postponing Milestone C by 12 months, which the Under Secretary of Defense (Acquisition, Technology, and Logistics) approved in March 2003. Formerly called the Advanced Amphibious Assault Vehicle (AAAV), the U.S. Marine Corps renamed the vehicle EFV in September 2003.

TEST & EVALUATION ACTIVITY

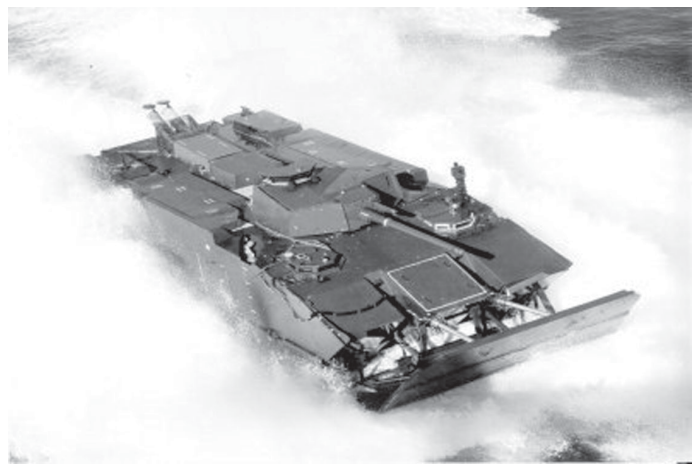
FY03 activities included continued developmental testing using the three Program Definition and Risk Reduction (PDRR)-phase EFV(P)s. This effort involves land mobility (vibration and track durability), water mobility (surf crossing, high/low water speed, and maneuverability), firepower testing (accuracy and ammunition characterization), and initial contractor shakedown testing of the first several of the SDD-phase vehicles. No OT&E events were conducted, but the Marine Corps Operational Test and Evaluation Activity (MCOTEA) observed and reported on a developmental test event that examined EFV compatibility with *Maersk* class Maritime Pre-positioning Force shipping and DoD-used railcars. DOT&E representatives observed a contractor developmental test event that employed the first SDD-phase EFV(P) to re-examine troop-carrying capacity and the amount of time it takes for Marines to egress from the vehicle.

LFT&E activities in FY03 included technical and validation testing of redesigned armors, some component technical testing, and revisions of the LFT&E Strategy in the TEMP. Technical and validation testing of the new armors will continue into FY04.

TEST & EVALUATION ASSESSMENT

The following corrective fixes have been identified, but not demonstrated, for SDD-phase vehicles:

- The PDRR EFV(P)'s weapon system is more capable than the weapon system aboard the AAV. However, shortfalls included a probability of hit less than required despite unchallenging conditions, limited fire-on-the-move capability, and problems with the gun's feed system that reduced the number of rounds that could be loaded.
- The PDRR EFV(P)'s land mobility capabilities effectively equaled the main battle tank's on primary and secondary roads. The PDRR EFV(P) could not keep up with tanks in moderate cross-country conditions and broke down when traversing more challenging cross-country terrain that was passable to both tanks and AAVs.



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NAVY PROGRAMS

- The PDRR EFV(P)'s demonstrated reliability (a Key Performance Parameter (KPP)) was roughly half the level that had been predicted at that stage of development.
- Safety-related concerns included high interior noise levels, carbon monoxide accumulation during 30 mm cannon firing, and elevated interior temperatures when operating in hot ambient conditions.

Although the Program Manager identified corrective fixes for the SDD-phase vehicles, they have mostly not been demonstrated. However, data from recently completed contractor developmental tests showed that the interior design changes implemented in the SDD EFV(P)s significantly increased troop carrying capacity and reduced the amount of time it takes for Marines to egress the vehicle. Therefore, it appears more likely that SDD EFV(P)s will meet the troop carrying KPP and Operational Requirements Document-specified egress time during the upcoming OT&Es.

The Maritime Pre-positioning Force shipping event showed that the vehicle was compatible with *Maersk* class ships in most respects; however, an EFV cannot move from its stowage area to the stern ramp in order to offload in-stream. The EFV's footprint is approximately 25 percent larger than an AAV's; thus, deck-space needed to embark EFV units will be correspondingly greater.

Assuming reliability improvement initiatives are adequately funded and weight-reducing design trades do not adversely affect reliability, the risk is still high that the vehicle's 70-hour mean time between operational mission failures (MTBOMF) requirement (a KPP) will not be met during IOT&E. Poor reliability jeopardizes mission accomplishment: If the EFV's MTBOMF falls short of the required 70 hours, fewer than 70 percent of a unit's EFVs would be predicted to complete the specified 24-hour mission without experiencing significant failures.

Operationally relevant questions will remain unanswered until OT&E resumes in FY05. The EFV(P) has not demonstrated that it can accomplish its primary mission, that is, transport combat-equipped Marines from an amphibious ship located 20 to 25 nautical miles offshore to objectives located inland without degrading their physical condition. The performance of an integrated EFV(C) will also not be demonstrated during OT&E until conducted by MCOTEA in FY05. Finally, concerns remain about the use of the less corrosion resistant aluminum alloy, Al 2519, and the potential impact on life cycle cost.

The test program described in the revised LFT&E Strategy, including thorough characterization of new armors, ballistic testing of new and unique EFV components, comprehensive controlled damage testing and full-up system-level testing of refurbished EFV(P) and EFV(C) SDD prototypes should be adequate to support the required vulnerability evaluation of the EFV. DOT&E and MCOTEA will continue to seek better insight into technical and developmental testing so as to best leverage data gathered in these tests and help refine the scope of full-up system level tests outlined in the LFT&E Strategy.